

Prevalence of work-related musculoskeletal disorders among the Ali-Ibn Abi-Talib hospital's staff in Rafsanjan city in 2019

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One of the problems of employees in different occupations, especially employees in multiple wards of the hospital, is work-related musculoskeletal disorders. Evaluating the incidence of work-related musculoskeletal illnesses and associated variables among employees is crucial in light of the significance of this problem and staff health. Therefore, we evaluated the prevalence of work-related musculoskeletal disorders among Ali-Ibn Abi-Talib Hospital's staff in Rafsanjan city in 2019. In this study, 220 staff members (143 females and 77 males) entered the study in 2019 with personal consent, and to collect data, the demographic information questionnaire and Nordic Musculoskeletal Questionnaire was used. The mean age of staff was 35.43 ± 8.08 including treatment staff (nurses-physicians) (46.8%), administrative staff (33.6%), and service staff (drivers-workers) (19.6%). Additionally, 40% of all work-associated musculoskeletal diseases were connected to the neck region, 38% to the knees, 36% to the lower back, and 12% to the elbows, feet, and ankles, 16% to the thighs, and 24.1% to the back. The prevalence of disorders in some areas, such as the neck was high as in some studies. Therefore, it seems that the necessary planning should be done to prevent further occurrence of these disorders among hospital staff, which may lead to inefficiency.

Keywords: Musculoskeletal disorders; Hospital staff; Rafsanjan; Nordic Musculoskeletal Questionnaire

Introduction

Job is one of the main needs of every person for personal and social development which has its advantages and disadvantages in every field, and one of these disadvantages is work-related musculoskeletal disorders (WMSDs) [1]. Hospital staff, like staff in any occupation, may suffer from these disorders [2]. In general, WMSDs

are disorders of various parts of the musculoskeletal system, including muscles, bones, tendons, ligaments, peripheral nerves, etc. which are caused by occupational factors [1, 3]. High working hours, improper equipment usage, activity in improper attitudes, repeated motions, and excessive force exertion during activity are also occupational causes of these illnesses [4-6].

Osteoarthritis (destruction of articular cartilage with new ossification at the surface, and periphery of the joints) [7], intervertebral discs (release of the central part of disc or nucleus pulposus from the peripheral part, or annulus fibrosis) [8], tendonitis (tendonitis with pain and burning, and tenderness outside the joint) [9], bursitis (painful bursa inflammation) [10] and carpal tunnel syndrome (pressure on the median nerve with pain, and numbness of the hands) [11] are several types of WMSDs. Moreover, various parts of the system, such as the knees, back, neck, shoulders, thighs, hands and wrists can be affected by WMSDs [12, 13].

The likelihood of developing a WMSD depends on the profession, activity, and occupational factors, and the likelihood of developing each disorder varies depending on the occupation. For instance, employees who use computers and type more frequently are more likely to experience hand involvement [14] or people like dentists who must perform prolonged head flexion are more likely to experience neck involvement [15], while lower back involvement is more common in nurses [16]. Thus, the prevalence of these disorders depends on individual factors (age, sex, body mass index), physical factors (type of work activity, regular exercise), occupational factors (working hours, work experience, family support), and work-related stress [17-23]. Clinical manifestations of WMSDs have a wide range depending on the type of disorder, and the involved area. In general, the main symptoms of these disorders are pain, limited mobility, fatigue, numbness, burning and muscle cramps [3]. Although there are several ways to prevent or reduce these disorders, having accurate knowledge and information about the musculoskeletal system and its disorders reduces people's exposure to their occurrence [20, 24].

This is because WMSDs are becoming more common, making prevention of them important. Therefore, considering the effect of WMSDs on physical, mental and social health of individuals, the study of musculoskeletal disorders among the staff of different wards of hospital is one of the important issues that can be researched. On the other hand, since musculoskeletal disorders are one of the most significant causes of early

retirement in the medical field and since human resources are one of any organization's most valuable resources, early diagnosis of these disorders is the first step in preventing and controlling early retirement caused by these disorders. Thus, considering the lack of information about the types of musculoskeletal manifestations among the staff of Ali Ibn Abi Talib Hospital in Rafsanjan, this study aimed to determine the prevalence of WMSDs and some related factors among the staff of this Hospital in 2019.

Materials and Methods

In this cross-sectional study, 220 employees from different wards of Ali Ibn Abi Talib Hospital in Rafsanjan in 2019 were evaluated. Inclusion criteria included:

- Have no musculoskeletal injuries (acquired, congenital or secondary),
- Voluntary and satisfactory participation in research,
- Have no rheumatic autoimmune diseases,
- Have no musculoskeletal disorders due to trauma
- Not being pregnant,
- Have no vascular diseases such as varicose veins,
- Have no chronic kidney disease and other debilitating diseases,
- Have no history of musculoskeletal surgery in terms of out-of-hospital accidents such as a car accident,
- Have at least one year of clinical experience,
- Lack of a second job.
- Moreover, exclusion criteria included:
- Dissatisfaction and collaboration during the study.

Demographic questionnaire and Nordic Musculoskeletal Questionnaire were used to collect data. The anonymous, two-part questionnaires asked about a variety of personal and professional factors, including age, sex, body mass index (BMI), residency, educational attainment, marital status, occupation, dominant hand, alcohol use, smoking, chronic disease, drug use history, regular exercise, and whether or not there were regular exercise, and whether or not there were stairs at the place of employment. The second part asked about work

experience. The participants were divided into three occupational groups including. Physicians-nurses (treatment staff) ($n = 15$ for Physicians and $n = 88$ for nurses), Employees (administrative staff) ($n = 74$), and workers drivers (service staff) ($n = 8$ for drivers and $n = 35$ for workers). The reason for this division was the small number of participants in some jobs. The second part was the standard ergonomic questionnaire to determine the prevalence of musculoskeletal disorders. The Nordic Questionnaire, currently known as the Nordic Questionnaire, was created and put into use in 1987 at the Institute of Occupational Health in the Nordic nations (Scandinavia). This questionnaire includes nine demographic questions (questions 1 to 9), nine questions (questions 10 to 18) about the severity of pain and burning, and discomfort in different parts of the body, eight individual questions (questions 19 to 26) about skeletal disorders in the form of yes/no and open answers, twelve questions (questions 27 to 38) about physical-occupational needs, and eight questions (questions 39 to 46) about the work-related psychological needs. Nordic. Nordic Questionnaire is used worldwide as a standard tool in epidemiological studies to assess WMSDs in various occupational groups and industries [25]. The validity and reliability of the Nordic standard questionnaire were evaluated by Azgoli et al. and confirmed by a correlation coefficient of 0.91 [26]. Translation, localization, face evaluation, and reproducibility were performed in the study of Mokhtarinia et al. [27].

The researcher was directed to the hospital in order to conduct the study, and after receiving ethics committee clearance and prior cooperation with hospital authorities, the researcher distributed questionnaires to the hospital employees during downtime. Participants were invited and reassured that their information was confidential. Then, whom had any type of musculoskeletal disorders were referred to a rheumatologist for examination to determine the type of disorder.

Finally, data analysis was performed by STATA statistical software, and then the results

of qualitative analysis were expressed as frequency / percentage and quantities with central indices (mean) and dispersion indices. Chi-square test was used for qualitative analysis in the absence of assumptions, and independent test was used for quantitative changes. Multivariate regression models are used to investigate the factors associated with musculoskeletal disorders and multivariate regression statistical models are used to eliminate interfering changes, such as age and sex.

In accordance with the intensity of their association with musculoskeletal disorders, confounding factors were included in the models based on their identification in the relevant literature. To achieve this goal, special two-level models were implemented to obtain the changes associated with musculoskeletal disorders. Then, the changes with a value of $P > 0.25$ were considered for multivariate analysis. Some variables, such as smoking and alcohol consumption, were not considered for the final analysis in terms of their low frequency

Results

The present study was performed on 220 participants, including 143 women (65%) and 77 men (35%), from the staff of Ali Ibn Abi Taleb Hospital, who were selected from different wards with a mean \pm standard deviation (SD) of age of 35.43 ± 8.08 . The mean \pm SD of work experience and body mass index (BMI) of the staff was 10.51 ± 7.72 years and 24.70 ± 3.87 kg/m², respectively. Moreover, most of them belonged to the Medical staff group (physicians-nurses) (46.8%). One hundred and forty one (64.1%) participants were married, 111 (50%) participants had regular exercise, and 185 (84.1%) participants had stairs in their workplace. The frequency of alcohol consumption and smoking was low among participants (1%). Also, 14.1% ($n=31$) of them had chronic diseases. Other demographic information is provided in [Table 1](#).

[Table 2](#) shows the prevalence of WMSDs over the past year. In general, 32.11% had no organ involvement. Moreover, the prevalence of WMSDs in at least one area of the body was

Table 1. Demographic information in study participants

Demographic information	Variable	Frequency (percentage)/ mean \pm SD
Sex	Man	77 (35)
	Woman	143 (65)
Residency	Native	192 (87)
	Non-native	28 (12)
Marital status	Single	78 (35)
	Married	141 (64.1)
Education (Degree)	Diploma and less	60 (27)
	Bachelor	111 (50)
	Master	34 (15)
Occupation	PhD and higher	15 (6)
	Physician-nurse	103 (46.8)
	Employee	74 (33.6)
Dominant hand	Worker-driver	43 (19.5)
	Right	195 (88)
Regular exercise	Left	25 (11)
	yes	111 (50)
Having stairs in workplace	no	108 (49.1)
	yes	185 (84.1)
Alcohol consumption	no	35 (15)
	yes	3 (1)
Smoking	no	217 (98)
	yes	3 (1)
Chronic disease	no	217 (98)
	yes	31 (14.1)
Drug history	no	189 (85)
	yes	28 (12)
	no	192 (87)
Age (year)	35.43 \pm 8.08	
BMI (kg/m ²)	24.70 \pm 3.87	
Work experience (year)	10.51 \pm 7.72	

SD, standard deviation. BMI, body mass index

reported in 7.89% of the participants. Involvement in 7 and 8 areas of the body was reported in 3 (1.38%) and 4 people (1.83%), respectively, while the highest frequency was

related to people who had two parts involved (14.7%). Thus, the highest prevalence of WMSDs was related to disorders in the neck area with 40%, knees with 38%, lower back with 36%

Table 2. Frequency of musculoskeletal disorders based on the number of members involved in the staff of Ali Ibn Abi Taleb Hospital in 2019

Number of areas	frequency	percentage
At least one	148	67.89
zero	70	32.11
one	27	12.39
Two	32	14.68
Three	28	12.84
Four	29	9.72
Five	21	9.63
Six	14	6.42
Seven	3	1.38
eight	4	1.83

and the lowest prevalence related to elbows, feet and ankles with 12%, thighs with 16% and back with 24.1% (Table 3). Additionally, according

to the findings in Table 4, a significant relationship between the involved areas and demographic data was only occasionally seen.

Table 3. Frequency of musculoskeletal disorders in different parts of the body in the staff of Ali Ibn Abi Taleb Hospital in 2019

Involved area	Frequency (percentage)
Wrist and hands	61 (27)
elbow	27 (12)
Shoulder	62 (28)
Knee	85 (38)
Foot and ankle	27 (12)
Thigh	36 (16)
Neck	88 (40)
Back	53 (24.1)
Lower back	81 (36)

For example, neck disorders, which were the most frequently involved area among participants, only had a significant relationship with gender, with women being more likely than men to experience them ($P < 0.05$). Therefore, the frequency of musculoskeletal disorders of the foot and ankle, as the least involved area, was significantly higher in women than men ($P < 0.05$), and no significant relationship was

observed with other variables for these areas ($P > 0.05$). Moreover, the frequency of disorders in all areas except the back area was significantly higher in women than men ($P < 0.05$). Only the frequency of elbow disorders was significantly higher in married people than single people ($P < 0.05$). The frequency of back, and knee disorders in physicians-nurses was significantly higher than other occupational groups ($P < 0.05$).

Table 4. Frequency of musculoskeletal disorders based on variables:

Variable		Foot and ankle	Knee	Thigh	Lower back	Back	Wrist and hands	Elbow	Shoulder	Neck
Sex	woman	26 (96)	62 (72)	31 (86)	62 (76)	39 (73)	49 (80)	24 (88)	55 (88)	69 (78)
	man	1 (3)	23 (27.1)	5 (13)	19 (23)	14 (26)	12 (19)	3 (11)	7 (11)	19 (21)
	P value*	0.000	0.050	0.004	0.006	0.119	0.003	0.005	0.000	0.001
Marital status	single	11 (40)	26 (30)	17 (47)	33 (40)	14 (26)	16 (26)	5 (18)	18 (29)	29 (32)
	married	16 (59)	59 (69)	19 (52)	48 (59)	39 (73)	45 (73)	22 (81)	43 (70)	59 (67)
	P value*	0.553	0.216	0.112	0.225	0.096	0.071	0.048	0.241	0.500
Occupation	Worker-driver	5 (18)	13 (15)	4 (11)	15 (18)	5 (9)	12 (19)	5 (18)	12 (19)	15 (17)
	Employee	7 (25)	22 (25)	12 (33)	21 (25)	16 (30)	22 (36.1)	7 (25)	27 (43)	31 (35)
	Physician-nurse	15 (55)	50 (58)	20 (55)	45 (55)	32 (60)	27 (44)	15 (55)	23 (37.1)	42 (47)
	P value*	0.588	0.018	0.321	0.109	0.030	0.875	0.588	0.118	0.739
Having stairs	no	1 (3)	6 (7.1)	7 (19)	12 (14)	3 (5)	5 (8)	2 (7)	7 (11)	12 (13)
	yes	26 (96)	79 (92)	29 (80)	69 (85)	50 (94)	56 (91)	25 (92)	55 (88)	76 (86)
	P value*	0.064	0.004	0.526	0.735	0.018	0.053	0.197	0.241	0.452
Regular exercise	no	16 (59)	38 (44)	22 (61)	48 (59)	32 (60)	27 (44)	14 (51)	32 (51)	48 (54)
	yes	11 (40)	47 (55)	14 (38)	33 (40)	21 (39)	34 (55)	13 (48)	30 (48)	40 (45)
	P value*	0.270	0.227	0.121	0.024	0.053	0.353	0.778	0.669	0.204

Additionally, individuals who worked in an environment with stairs had these diseases more often than those who did not ($P < 0.05$). People who regularly exercised had greater rates of wrist,

hand, and knee diseases than those who did not, although this difference was not statistically significant ($P > 0.05$). The frequency of lower back disorders in people without regular exercise

was significantly higher than people with regular exercise ($P < 0.05$). In other areas, the disorders were higher in people without regular exercise, but no significant difference was observed ($P > 0.005$). In this research, individuals with elbow diseases had the greatest mean age, BMI, and job experience; participants with thigh disorders had the lowest mean age and work

experience; participants with wrist and hand problems had the lowest mean BMI (Table 5). The mean of age, BMI and work experience was significantly higher in the participants with elbow disorders than participants without elbow disorders ($P < 0.05$); however, there was no significant relationship among these variables and disorders of other areas ($P > 0.05$) (Table 5).

Table 5. Mean \pm SD of quantitative data in participants with and without musculoskeletal disorders

Variable		Foot and Ankle	Knee	Thigh	Lower back	Back	Wrist and Hands	Elbow	Shoulder	Neck
Age	With	33.65 \pm	35.66 \pm	33.00 \pm	35.52 \pm	36.92 \pm	35.60 \pm	40.16 \pm	35.19 \pm	34.99 \pm
	MSD	9.74	8.83	8.40	8.73	8.67	9.00	9.59	8.80	8.37
	Without	35.71 \pm	35.28 \pm	35.86 \pm	35.37 \pm	34.89 \pm	35.36 \pm	34.71 \pm	35.53 \pm	35.73 \pm
	MSD	7.78	7.61	7.97	7.74	7.89	7.71	7.61	7.78	7.89
	P value*	0.230	0.764	0.079	0.904	0.134	0.860	0.002	0.795	0.533
BMI	With	24.76 \pm	24.74 \pm	24.50 \pm	24.67 \pm	24.86 \pm	24.18 \pm	26.81 \pm	25.11 \pm	24.44 \pm
	MSD	5.00	4.09	3.01	3.92	3.89	3.86	5.14	3.87	4.00
	Without	24.69 \pm	24.67 \pm	24.73 \pm	24.71 \pm	24.56 \pm	24.89 \pm	24.45 \pm	24.54 \pm	24.87 \pm
	MSD	3.70	3.75	4.02	3.85	3.83	3.87	3.63	3.87	3.79
	P value*	0.943	0.899	0.691	0.955	0.628	0.237	0.048	0.337	0.432
Work experience	With	8.52 \pm	10.92 \pm	7.96 \pm	10.88 \pm	11.93 \pm	10.82 \pm	14.68 \pm	9.91 \pm	9.60 \pm
	MSD	7.33	8.33	6.55	8.61	8.12	8.04	8.62	8.08	8.14
	Without	10.86 \pm	10.25 \pm	10.98 \pm	10.28 \pm	9.90 \pm	10.36 \pm	9.81 \pm	10.77 \pm	11.18 \pm
	MSD	7.75	7.32	7.84	7.15	7.57	7.58	7.36	7.57	7.36
	P value*	0.181	0.602	0.078	0.660	0.144	0.730	0.006	0.527	0.211

MSD, musculoskeletal disorders. BMI, body mass index.

Thus, to evaluate the relationship among demographic variables with musculoskeletal disorders in at least one organ of the body, univariate logistic regression model was used and to remove confusing variables, multivariate

logistic regression model was used. The results of multivariate model showed that there is a significant relationship among musculoskeletal disorders in at least one organ of the body with gender, so that the chance of having a disorder in women was 2.54

Table 6. Results of univariate and multivariate logistic regression model to investigate the factors affecting musculoskeletal disorders in staff of Ali Ibn Abi Talib Hospital in 1400

Variable		Univariate			Multivariate		
		OR	CI 95%	P value	OR	CI 95%	P value
Sex	Man	1	-	-	1	-	-
	Woman	2.52	1.40-4.54	0.002	2.54	1.38-4.67	0.003
Job	Worker-driver	1	-	-	1	-	-
	Employee	1.07	0.50-2.32	0.856	0.96	0.43-2.15	0.922
	Physician-nurse	1.99	0.92-4.25	0.077	1.54	0.70-3.42	0.280
Stairs	No	1	-	-	1	-	-
	Yes	2.01	0.96-4.20	0.063	1.86	0.84-4.12	0.124
Exercise	No	1	-	-	-	-	-
	Yes	0.73	0.41-1.30	0.281	-	-	-
Age		0.99	0.96-1.03	0.858	-	-	-
BMI		0.97	0.90-1.04	0.458	-	-	-
Work experience		0.98	0.93-1.02	0.348	-	-	-

(1.38-4.67) times higher than men (Table 6).

Discussion

This study aimed to investigate the frequency of WMSDs, and its related factors among hospital staff. The most WMSDs were related to the neck, knees, lower back and the least related to the elbows, foot, ankles, thighs and back. Several studies reported the most common involvement of the lower back including Heidari et al. with 88.3% [28], Taghinejad et al. with 40% [29], Rathore et al. with 32% [30], Barzidehet al. with 61.8% [31], Magnago et al. in Brazil with 71.5% [32] and Maul et al. in Switzerland with 76% [33]. It has been confirmed by many other studies [34, 35]. In contrast, different studies have reached different conclusions. Several studies reported the most common WMSDs in the neck and knees [15, 35, 36]. WMSDs are one of the injuries in the workplace that can affect the quality of life of employees and even reduce the physical, mental, social health and employee productivity. As in other studies, some related factors were studied. A small number of factors had a significant relationship with the frequency of these disorders. There was a significant relationship among the occupations of the participants, including service personnel, administrative personnel, medical personnel and back and knee disorders. According to research by Shokati et al., radiologists were substantially more likely to have these conditions in their legs, neck, shoulders, and knees than nurses were in their neck, thighs, legs, and lower back [37]. Generally, the prevalence of these disorders in different occupations was evaluated, which it was 87.9% among European neurosurgeons [38], and 60% among Chinese nurses [16]. Therefore, employees of different occupations can suffer from various musculoskeletal disorders, which are highly prevalent according to the mentioned studies.

Another variable we studied was gender. In general, the disorders in all areas except the back had a significant relationship with gender, and in the study of Yang et al. in 2019 among nurses in China, also gender had a significant relationship with lower extremity, waist, neck, and shoulders disorders [39]. Therefore, various studies have

reported varying findings for the association between gender and these problems in each part of the body, and it is not feasible to draw an accurate conclusion. This discrepancy may be caused by small sample size, disparities in occupational roles, or both. Only waist disorders were significantly associated with regular exercise. Lack of regular exercise was one of the factors affecting the frequency of disorders in this area. Ribeiro et al. reported that regular exercise was one of the most important factors for the disorders of the lower back, neck, dorsal region, shoulders, wrists and hands, which a significant relationship was observed with disorders of all these areas [17]. In addition to not exercising regularly, frequent and inappropriate activities at work, such as standing, bending and twisting the body, excessive force with hands and fingers, and frequent hand movements, are effective factors [17]. Activity duration is also important. In a study on surgeons, the most important cause of neck disorders was bending the neck during long operation [40]. A significant relationship was observed between neck disorders and the number of working hours per day in Sirajudeen's study, and individuals with working hours of 6 to 10 hours per day were most involved [41], and studies examining the number of working hours per day and the number of years of work experience showed similar results to the effect of duration of activity. Emmanuel et al. showed that the prevalence of disorders in different areas was significantly related to the years of activity, and work experience [24]. In the present study, it was found that the frequency of elbow disorders has a direct and significant relationship with the years of work experience, and the effect of having stairs in the workplace was investigated which was concluded that the frequency of back, and knee disorders was significantly higher in people who had stairs in their workplace, and these results may be in terms of frequent knee bends at work while crossing the stairs.

Conclusion

The results of our study showed that among 220 participants, the most WMSDs were related to the neck area with 40%, knees with 38%, waist with 36% and the lowest related to elbows, feet,

and ankles with 12%, thigh with 16% and back with 24.1%. Additionally, a limited number of instances showed a significant correlation between the involved regions and demographic data. As a result, the most prevalent area of involvement among participants, neck musculoskeletal condition, showed a significant correlation solely with gender (women more often than males). Furthermore, the frequency of musculoskeletal disorders in the foot and ankle as the least affected area was significantly higher only in women than men and no significant relationship was observed with other variables.

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Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this study.

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